THURSDAY, MARCH 11, 1886

THE SCIENTIFIC RELIEF FUND

A TIME in which so many heartrending calls are being made upon the benevolent seems but ill-adapted for pressing any schemes not immediately connected with any specially urgent distress. There is, however, at present an appeal being made by the Royal Society to all who are in any way interested in science, which, though on behalf of a permanent fund, and not connected with any ephemeral distress, has long been felt to be necessary, and which peculiar circumstances render it imperative now to press forward without delay.

For some years past the Scientific Relief Fund administered by the Royal Society has been found insufficient properly to meet the numerous claims made upon it, and the Committee in charge of the Fund has been frequently hampered in its action in consequence. Of course the demands upon it are variable in their character and extent, being chiefly dependent on what may be called the chapter of accidents; but there are few years that pass without some one of greater or less scientific repute being carried off by an untimely death without having made due provision for those whom he leaves behind him; and perhaps fewer years still in which some earnest worker is not laid low by sickness, and finds himself reduced by an unforeseen chain of circumstances to a condition in which a grant from a fund administered by his scientific brethren is of inestimable value both materially and morally.

The income of the Scientific Relief Fund has not hitherto exceeded some 250*l.* per annum, its capital at the close of last year being about 7500*l.* With the view of increasing this capital sum to at least 20,000*l.* a most munificent offer has been made by Sir William Armstrong, who was among the original founders of the Fund. It is that he will present 6500*l.* to the Fund provided certain conditions are fulfilled, the principal of which is that an equal amount be raised from other sources within the current year. We earnestly hope that there may be no difficulty in accomplishing this, and, with the view of making the scope and character of the Fund more fully understood, we annex a few explanatory particulars.

It was in the year 1859 that the idea of creating a Scientific Relief Fund occurred to the minds of the late Mr. Gassiot and some other Fellows of the Royal Society, and the regulations under which it was to be administered were carefully considered, and, having been adopted by the Royal Society, have remained practically unchanged until the present day. The object of the Fund is defined to be for the aid of such scientific men or their families as may from time to time require and deserve assistance. Cases, however, can only be entertained on the recommendation of a President of one of the chartered Societies, it being understood that he consults the Councils over which he presides as to the person whom he intends to recommend for relief. The Committee administering the Fund, though Fellows of the Royal Society, are not members of its Council, and the senior member of its body retires annually, another Fellow being appointed in his place. It will thus be seen that every reasonable precaution has been taken for the impartial and judicious administration of the Fund; and since its foundation nearly a hundred recipients of well-timed grants have had reason to bless its existence.

It may perhaps be said that men of science ought to be able to foresee what is coming, and be prepared to meet all the changes and chances of this mortal life, and possibly as a class they are more than usually exempt from those reverses of fortune to which all are liable. It is, however, the unforeseen that constantly occurs, and the temporary aid which, by means of such a Fund, a man can receive from a committee of his fellow-workers may be accepted with all gratitude, and without that humiliation which would be felt did the relief proceed from any more ordinary source of charity.

But although men of science may as a rule be prudent, it can hardly be said that they are as a class rich. Their researches may aid others in the acquisition of material wealth, but the cases are exceptional where the pursuit of science has brought large pecuniary gains to the student. Where it has, we are confident that others besides Sir William Armstrong will aid those less fortunate in this particular than themselves by contributing liberally to this Fund.

There is, however, another and important class of persons whose ample fortunes have been the result of the judicious application of science in economic pursuits, and we may be sure that the wants of the Fund have only to be brought under their notice to assure ready and efficient aid in raising the amount necessary to meet Sir William Armstrong's munificent offer. Already we see on the list a noble subscription of five hundred guineas from Mr. Ludwig Mond, and we venture to hope that by thus giving publicity to what is at present being done to enlarge the scope of this most useful Fund, others directly and indirectly interested in science may be led to follow so generous an example.

Looking at the extent to which the material welfare of this country has now for many years been intimately connected with its scientific progress, the debt due from all to the workers in science must at once be appreciated, and a more practical manner of acknowledging this indebtedness can hardly be suggested than that of contributing to the Scientific Relief Fund.

THE BOTANY OF THE ROCKY MOUNTAIN REGION

Manual of the Botany of the Rocky Mountain Region, from New Mexico to the British Boundary. By John M. Coulter, Ph.D., Professor of Botany in the Wabash College. (New York and Chicago: Ivison, Blakeman Taylor, and Co, 1885.)

THE object of this manual, as stated in the preface, is to do for the range of country in which the plants it describes are found, what has for a long time been so admirably done for the North-Eastern States of the Union by Asa Gray's manual. It hence affords a means of comparison between two distant areas, each of such considerable dimensions as to throw much light on the flora of temperate North America. And not only with the flora of the Eastern States does it compare, for, the botany of the great Western area included in California having also been recently worked out, the three floras together enable a fairly accurate estimate to be formed of the nature and extent of the vegetation of the middle regions of temperate North America from ocean to ocean. Thus Gray's manual takes in the States between the Atlantic and Mississippi, which lie north of Tennessee and North Carolina; that is, approximately between lats. 36½° and 46° N., and is essentially the vegetation of a wooded region with high-lands towards the coast. The Rocky Mountain manual occupies a rather smaller area, comprising the States of Colorado, Wyoming, Montana, Western Dakota, Western Nebraska, and Western Kansas. Its southern and northern limits are on the same parallel as those of Gray's "Flora," and its eastern limits (the 100th meridian) is nearly parallel to and as long as Gray's western, and distant from it about 400 miles. Its western frontier is a very irregular one, following the north-western and south-eastern direction of the great mountain plateau; and borders the Pacific States of Washington and Oregon, and the interior ones of Nevada and Utah. It is essentially an Alpine and prairie vegetation; probably most or all of it is above 4000 feet of elevation, with mountains attaining a maximum of over 14,000 feet (Mount Gray). The Californian flora, again, does not occupy half the area of either of the others. It extends rather further south, to lat. 35°, and only to 45° N. Though only 200 miles in average breadth, it is infinitely richer than both the others combined, having a mountain flora—the Sierra Nevada—throughout the length of its eastern boundary, a coast flora along the Pacific, a hill flora along a coast range, and a valley flora between the latter and the Sierra Nevada.

Comparing the areas thus limited with that of the whole breadth of what may be regarded as temperate North America (in contradistinction to the cold British possessions to the north of 48° and the hot ones to the south of 35°), it will be seen that they together cover nearly four-fifths of the breadth of the continent, of which 1200 miles are in the limits of Gray's "Flora," 700 in Coulter's, and (though not in the same parallel) 200 in the Californian. The strips of country not included are, the wooded region west of the Mississippi, and the prairies between the latter and the 100th meridian, and the region of the Great Basin, between the Rocky Mountains and the Sierra Nevada. Neither of them can, however, be expected to add much to the sum of the three floras now under consideration, for on the one hand the western wooded region of the Mississippi cannot add much to Gray's flora or the eastern prairies to Coulter's; and on the other hand, as the Rocky Mountain flora takes in the plants of the western fringe of the Great Basin, and the Californian its eastern fringe, the intermediate region cannot add very much to what these two floras contain.

Dr. Gray[1] has in various essays admirably discussed the characteristics of the three longitudinal zones of North American vegetation, and clearly indicated their composition and relations. In no region of the northern hemisphere, nor perhaps anywhere on the globe, can three parallel meridional floras so different in their aspect and elements be found within such narrow limits, as the middle unforested zone of North America separating two heavily forested ones, the latter differing from one another by hundreds of genera and thousands of species.

The richness of the three floras as expressed by genera and species is, in round numbers—

	Genera	Species	(European)
Rocky Mountain Flora ...	500	1750	(300)
Eastern United States ...	660	2150	(370)
Californian	764	3786	(225)

A striking difference between the Pacific and Atlantic floras is in the relative numbers of the two primary groups of Dicotyledons: the Polypetalæ and Monopetalæ, which in California are as eighteen to ten, but in the Eastern States nearly equal. In both the Incompletæ amount to about one-third of the Monopetalæ, in which respect the Rocky Mountain flora assimilates to the Eastern one. But the most remarkable difference between the three floras is in the relative proportion of Monocotyledons and Dicotyledons, which is about 1 : 2·18 in the Eastern United States; 1 : 3 in the Rocky Mountains; and 1 : 4·9 in California. This is mainly due to the greater number of Junceæ, Cyperaceæ, and Gramineæ in the Rocky Mountains and Eastern States, and the abnormal excess of various Dicotyledonous families in California. So too with the proportion of genera to species: it is nearly the same in the Rocky Mountains and Eastern States (1 : 3·5 and 1 : 3·3), but in California, owing very much to the number of monotypic genera, it is nearly as 1 : 5.

Regarding the composition of the Rocky Mountain flora, the most remarkable facts are the number of Compositæ, amounting to one-fifth of the Phanerogams, thus far exceeding the proportions in the Eastern United States (about one-seventh), and in California (about one-eighth). Of this order nearly forty genera do not occur in the Eastern States. Leguminosæ come next in order of number of species, as they do in California, where, however, they are fewer in proportion to the whole flora. These, with Gramineæ, Cyperaceæ, Scrophularineæ, and Rosaceæ, which follow next in order of numbers (six families in all), embrace half the Rocky Mountain Phanerogamic flora. In the Eastern United States half of the flora consists of seven families, of which the five first are the same as in the Rocky Mountain flora; but Scrophularineæ are replaced by Ericeæ, and Ranunculaceæ are to be added. In California, on the other hand, species of no fewer than thirteen families must be added together to embrace half the flora.

But the most conspicuous difference to the eye between the vegetation of the Rocky Mountains and the Eastern States consists in the absence in the former of almost all the Coniferæ and Cupuliferæ of the latter, together with the whole Orders of Magnoliaceæ, Tiliaceæ, Juglandeæ, Platanaceæ, and Droseraceæ, and the rarity of Hypericineæ, Rubiaceæ, Lobeliaceæ, Ericeæ, Labiatæ, and Orchideæ, and of water-plants generally. On the other hand, there is in the Rocky Mountains a much greater abundance of Cruciferæ, Portulaceæ, Loasaceæ, Cactaceæ, Polemoniaceæ, Borragineæ, Solanaceæ, Chenopodiaceæ, Polygoneæ, and Nyctagineæ, — all showing the flora to partake far more of that of the Pacific than of the Atlantic coast. It differs, however, notably from the Californian flora in the paucity of Papaveraceæ, Rhamneæ, Hydrophyllaceæ, Labiatæ, Cupuliferæ, Coniferæ, and Liliaceæ.

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[1] "Statistics of the Flora of the Northern United States" (*American Journal of Science and Arts*, vol. xxiii.); "Remarks concerning the Flora of North America" (*American Journal of Science and Arts*, vol. xxiv.); "Vegetation of the Rocky Mountain Region" (*Bulletin* of the United States Geological and Geographical Survey, vol. vi. No. 1, 1881); "Characteristics of the North American Flora" (*British Association Reports*, Montreal, 1882, and *American Journal of Science*, vol. xxviii. 1884).

The distribution in the United States of America of the 480 indigenous European species,[1] which form an integral part of their flora, offers some very interesting matters for consideration. Of these there are indigenous to the

Rocky Mountain Flora	about 300
Eastern United States	„ 370
Californian	„ 225
Common to all	„ 135

The following list of some of the Rocky Mountain species not found either in the Eastern Alps or Sierra Nevada of California is a very instructive one. No doubt some occur in the northern continuation of the Sierra Nevada, in Oregon, and Washington, &c.; such are therefore plants of the Pacific States, though not Californian:—

Ranunculus hyperboreus, nivalis, pygmæus, and affinis
Thalictrum alpinum
Papaver nudicaule
Draba stellata, incana
Viola biflora
Cerastium alpinum
Sagina nivalis
Elatine triandra
Astragalus hypoglottis
Potentilla nivea
Saxifraga Hirculus, flagellaris, cæspitosa, cernua, adscendens, punctata
Chrysosplenium alternifolium
Epilobium latifolium
Adoxa Moschatellina
Hieracium umbellatum
Campanula uniflora
Androsace Chamæjasme
Gentiana frigida, glacialis, prostrata
Swertia perennis
Lloydia serotina
Juncus triglumis, castaneus
Kobresia caricina
Carex microglochin, rupestris, obtusata, frigida, ampullacea, nardina, gynocrates, incurva, stenophylla, elongata, leporina
Alopecurus alpinus
Deyeuxia lapponica
Catabrosa aquatica

These it will be seen are for the most part Arctic plants, whose presence might be expected on any range of mountains of sufficient elevation in America; but they are absent both in the Sierra Nevada and the White Mountains of the Eastern States. On the other hand, it is not easy to account for the absence in the Rocky Mountains of an even greater number of European species which are found in the Eastern States or in California, or both, and of which some occur in most other meridians of the globe. Such are especially

Caltha palustris
Nuphar lutea
Cardamine bellidifolia and pratensis
Arabis petræa
Drosera (all the 3 European species)
Arenaria peploides
Montia fontana
Oxalis Acetosella
Oxytropis campestris
Rubus Chamæmorus
Circæa lutetiana and alpina
Lythrum Salicaria
Lobelia Dortmanna
Ericeæ (12 species, nearly all Arctic, and both European and Asiatic)
Menyanthes trifoliata
Trientalis europæa
Euphrasia officinalis
Prunella vulgaris
Armeria vulgaris
Myrica Gale
Salix herbacea
Betula alba
Taxus baccata
Rhynchospora alba and fusca
Carex (24 species, chiefly boreal)
Tofieldia palustris
Narthecium ossifragum
Luzula arcuata
Hierochloe alpina
Aira atropurpurea
Glyceria fluitans

Neither the climate of the Rocky Mountain region, its elevation, its geological structure or its physical features, appear to present obstacles to the migration into it of these common plants of the colder north temperate zone from Canada or from the Eastern United States. It is still more difficult to understand how those that occur in all three adjacent American regions should have become excluded from the fourth, which they may be said to bound.

It remains to add that Dr. Coulter's manual is well got up, and though claiming in the preface to be no more than a compilation, it is really a very useful work. The only important omission observed, and it is a very serious one, is that of the elevations at which the plants grow. It is a great advance on the fragmentary "Synopsis of the Colorado Flora" by Porter and Coulter, which was welcome in its day; and though there is no doubt that a good many more species will be found in a future edition, and that some of the data extracted above will be thereby interfered with, there is no reason to suppose that these will clash with the main facts, which so amply confirm all the conclusions that Asa Gray drew years ago from the comparatively imperfect data then at his disposal.

J. D. H.

MORLEY'S "ORGANIC CHEMISTRY"

Outlines of Organic Chemistry. By H. Forster Morley, M.A., D.Sc. (London: J. and A. Churchill, 1886.)

THE *faults into which the writer of a text-book of* organic chemistry for students is apt to be led are, as Dr. Morley points out in his preface, that of over-elaboration on the one hand, to which the material too readily lends itself, and that of unintelligent abridgment on the other. Dr. Morley adopts a satisfactory compromise by selecting for treatment a relatively small number of typical compounds, giving, however, "as much consideration to each compound as it would receive in a large treatise." Some departures from this rule are, as he candidly confesses, due to the necessity of taking into account "the requirements of students working for examinations."

Dr. Morley's arrangement of his subject is new—so far at least as it has not been anticipated in Prof. Remsen's "Organic Chemistry," which, however, did not appear until after the completion of the present work in manuscript. "I have endeavoured," he says, "to describe compounds in the order in which they may be synthetically produced, so that each compound should be a product of the one before and a producer of the one after." We must confess to having doubts as to how far, save in the interests of very young students, such an entire sacrifice of the symmetry of the ordinary classification as is involved in this arrangement is judicious.

Most text-books of organic chemistry contain, prefixed to each class of compounds, preliminary chapters dealing with the general modes of preparation, the properties and the reactions of the entire class. This arrangement finds no favour in the author's eyes. "Not until he (the student) finds that a series of reactions can be grouped together under some general expression should he be allowed to mention a general law." The principle is doubtless, within its proper limits, sound; but we should

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[1] In Gray's "Vegetation of the Rocky Mountain Region," cited above, will be found an exhaustive table of comparison of all the Alpine plants of the Atlantic, Pacific, and Rocky Mountain regions as then known. Coulter's "Flora," however, introduces considerable modifications in its details.